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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/075,901	02/14/2002	Frank E. Aspen	10321US01	9302

7590 04/23/2004

Attention: Eric D. Levinson
Imation Corp.
Legal Affairs
P.O. Box 64898
St. Paul, MN 55164-0898

EXAMINER

CHANG, AUDREY Y

ART UNIT	PAPER NUMBER
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2872

DATE MAILED: 04/23/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/075,901	ASPEN, FRANK E.	
	Examiner	Art Unit	
	Audrey Y. Chang	2872	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-22 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>7/3/2003</u> | 6) <input type="checkbox"/> Other: ____ |

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. Claims 1-17, 18 and 21 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was **not** described in the specification in such a way as to **enable** one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

The specification fails to teach how could the anti-reflective coating is capable of “causing the medium to have less than 1.0 percent reflectivity of S-polarized light” as recited in claims 1 and 18. It is understood in the art that it is the anti-reflective coating **itself** that has the property of reducing the reflectivity not that it “causes” the hologram medium to have this reduced reflectivity. Claims 2-27 inherit the rejection from their based claim.

The specification fails to teach how can a hologram be stored in the holographic data storage medium “using a laser beam directed toward the holographic data storage medium” as recited in claim 21. A hologram basically is a recording of *interference* between at least **two** coherent light beams intercept at the storage medium, to use one laser beam to direct on the storage medium will not be able to store a hologram.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. **Claims 1-9, 12 and 18-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over the article “A broadband antireflection coating for enhanced holographic recording and readout in**

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bismuth silicon oxide” by Karim et al (Appl. Phys. Lett. 70 (210, 1997) and in view of the patent issued to Murata et al (PN. 6,574,039).

Karim et al teaches an *antireflection coating* comprises two quarter-wave dielectric layers that is coated on a *holographic recording medium* for reducing angular dispersions for both TE and TM polarized wave (also known in the art as S and P polarized wave) of the incident light when used to record and/or to readout a hologram.

Karim et al teaches that the anti-reflection coating that is comprised of the two quarter-wave dielectric layers of MgF_2 and ZrO_2 is capable of making the reflectivity of the TE or S polarized light to be less than 2% for an angle of incidence up to 45 degrees, (please see the abstract). However it does not teach explicitly that the antireflection coating is able to make the reflectivity of S-polarized light at incident angle greater than 50 degrees to be less than 1%, or to have the reflectivity of S-polarized light at incident angle at 60 degrees to be less than 0.5% or 0.25%. Murata et al in the same field of endeavor teaches a plurality of designs for anti-reflective coatings, wherein each design comprises a plurality of dielectric thin films with desired thickness such that the anti-reflective coatings are capable of making the S-polarized light of *incident light at incident angle greater than 50 degrees, at an 60 degrees, or between 10 degrees to 60 degrees to be less than 0.25%*, (please see Figures 1-4, and 7-10). It would then have been obvious to one skilled in the art to apply the teachings of Murata et al to replace and to design the anti-reflective coating of Karim et al accordingly to allow the further reduction of S-polarization light of the incident light to be less than 1 or 0.25 percent at even greater incident angle for the benefit of making the recording and readout of the hologram with higher efficiency and increasing the incident angular range of the recording light beam that can be utilized.

With regard to claims 6 and 20, the low reflectivity (less than 2% or even 0.25%) of the S-polarization light by the anti-reflective coating suggests the transmission of the S-polarized light has to be greater than 95%, (by the law of energy conservation).

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With regard to claims 7 and 8, both Karim et al and Murata et al teach that the anti-reflective coating is comprised of multi-layer stack of oxide layers.

With regard to claims 9 and 12, these references do not teach explicitly that the wavelength of the S-polarized light is at either 405 nm or 532 nm. However both Karim et al and the Murata et al teach that the multi-layer stacks of the anti-reflective coating are designed so that the optical thickness of each layer is either equal to or close to quarter of a *central wavelength interested*. It would then have been obvious to one skilled in the art to modify the thickness of the oxide layers in the multi-layer stacks in accordance with a design central wavelength chose to be either of 405 nm or 532 nm for the benefit of particularly making the hologram be more efficiently recorded in the recording medium with the anti-reflective coating using light beam with either 405 nm or 532 nm wavelengths. These two wavelengths are in the visible range and are well known in the art to be used in optical recording apparatus.

With regard to claims 18, 21 and 22, Karim et al teaches that the hologram is recorded by using a laser light source that generates an object beam and a reference beam each passes through shutter and mirrors (M1, and M2 or M3, respectively), such that the light beams are directed to incident on the recording medium to form interference pattern that is then recorded in the medium as the hologram. The hologram can then be readout by using the laser light source to generate the reference beam again and Karim et al teaches that a detector is provided to detect the readout hologram, (please see Figure 1). Although this reference does not teach explicitly about the angle of incident of the recording and/or readout light beams, however it would be possible and obvious for one skilled in the art to have the incident angle be greater than 50 degrees since Karim et al in combined with the teachings of Murata et al allow the reflectivity of S-polarized light to be lower than 1% at incident angle greater than 50 degrees which greatly improve the diffraction efficiency of the recorded hologram at higher incident angle.

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4. Claims 16 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over the article "A broadband antireflection coating for enhanced holographic recording and readout in bismuth silicon oxide" by Karim et al (Appl. Phys. Lett. 70 (210, 1997) and in view of the patent issued to Murata et al (PN. 6,574,039) as applied to claim 1 above, and further in view of the patent issued to Chen et al (PN. 6,563,977).

The anti-reflection coating for enhanced holographic recording and readout taught by Karim et al in combination of the teachings of Murata et al as described for claim 1 above has met all the limitations of the claims. With regard to claim 16, Karim et al teaches that the holographic recording medium comprises a photorefractive crystal but does not teach explicitly that the medium is a photopolymer sandwiched between two substrates. However photopolymer is a well known holographic recording material in the art as demonstrated by the teachings of Chen et al, wherein a holographic element (16) comprises of *photopolymer* interposed between *two substrates* (18a and 18b, column 8, lines 18-29). With regard to claim 17, Chen et al teaches that the two substrates are each coated with an *anti-reflective coating* to enhance the passage of the light through the holographic element. It would then have been obvious to one skilled in the art to modify the holographic recording of Karim et al to allow more types of hologram recording media being used and utilizing the more efficient recording geometry with reduced reflectivity of the S-polarized light that may cause unwanted noises being recorded in the medium.

Allowable Subject Matter

5. The following is a statement of reasons for the indication of allowable subject matter: the anti-reflective coating coated on a hologram medium that makes the S-polarized light incident on the hologram medium at an angle greater than 50 degrees to have reflectivity less than 1 percent, where the anti-reflective coatings having the specific designs as set forth in claims 10-11, and 13-15.

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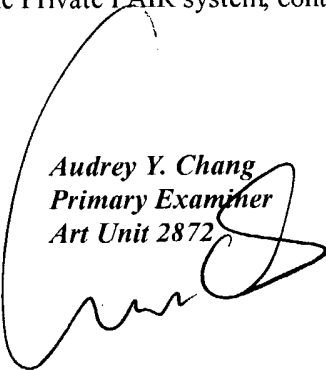
Conclusion

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Audrey Y. Chang whose telephone number is 571-272-2309. The examiner can normally be reached on Monday-Friday (8:00-4:30), alternative Mondays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew Dunn can be reached on 571-272-2312. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Audrey Y. Chang
Primary Examiner
Art Unit 2872



A. Chang, Ph.D.